

Chapter VIII Ceramics materials

§ 8-1 Introduction

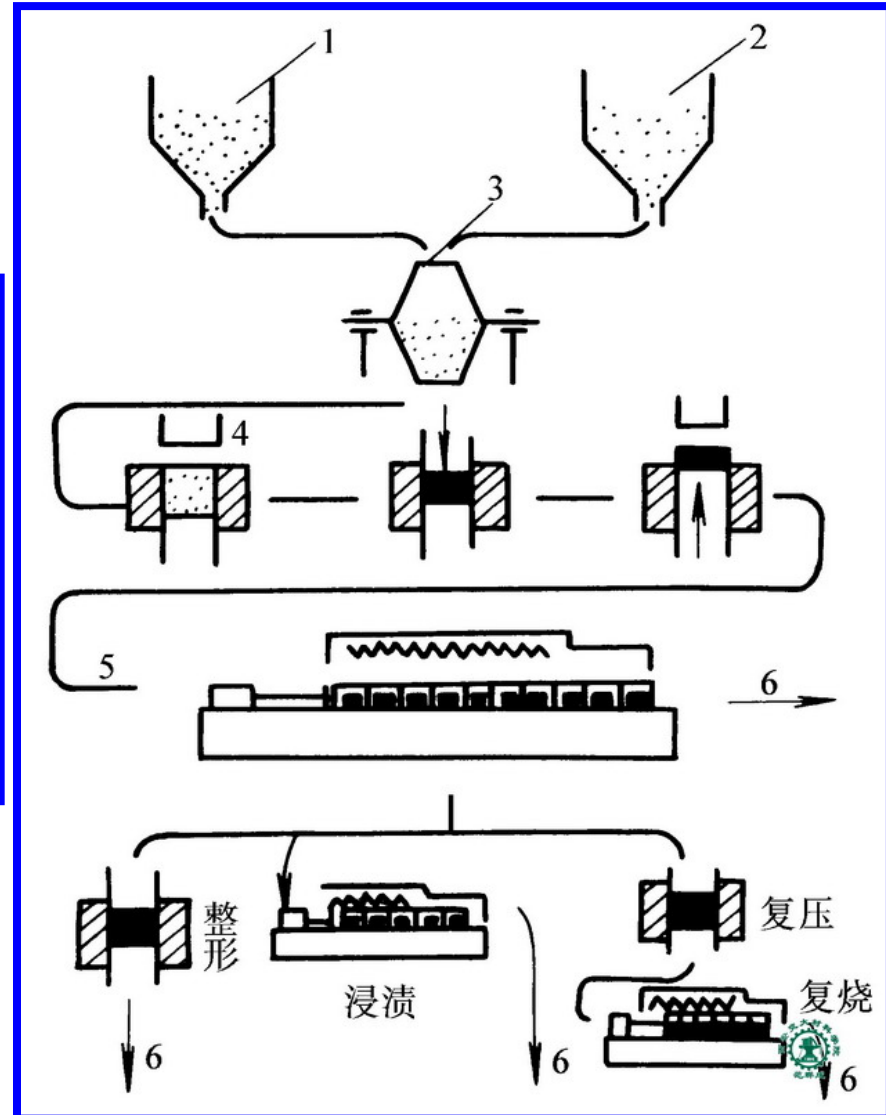
8.1.1 The classification and preparation of ceramics materials

1. What is the ceramics material
2. The classification of ceramics materials



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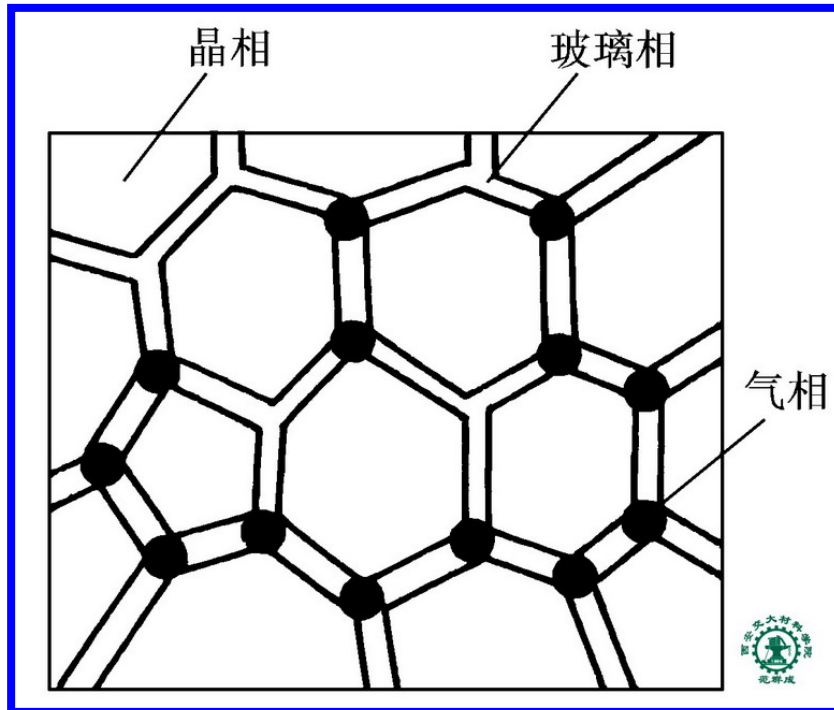
3. The preparation of ceramic products



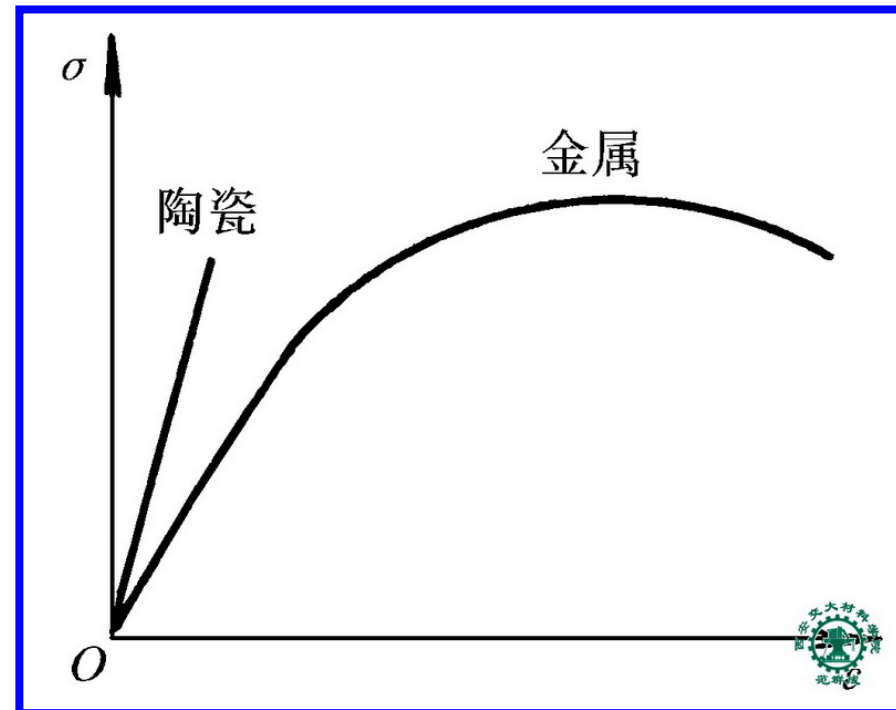
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8.1.2 The structure and property feature of ceramics materials

1. The structure of ceramics materials



Schematic of microstructure of ceramics



Schematic of tension stress-strain curve of ceramics and metal

2. The property feature of ceramics materials

THE END

§ 8-2 Ceramic materials for engineering structure

表 8-1 常用工程结构陶瓷的种类、性能和应用

| 名称 | | 密度 g/cm ³ | 抗弯强度 /MPa | 抗拉强度 /MPa | 抗压强度 /MPa | 膨胀系数 /10 ⁻⁶ °C ⁻¹ | 应用举例 |
|------|----------------------|----------------------|-----------|----------------|-----------|---|--|
| 普通陶瓷 | 普通工业陶瓷 | 2.3~2.4 | 65~85 | 26~36 | 460~680 | 3~6 | 绝缘子, 绝缘的机械支撑件, 静电纺织导纱器 |
| | 化工陶瓷 | 2.1~2.3 | 30~60 | 7~12 | 80~140 | 4.5~6 | 受力不大、工业温度低的酸碱容器、反应塔、管道 |
| 特种陶瓷 | 氧化铝瓷 | 3.2~3.9 | 250~450 | 140~250 | 1200~2500 | 5~6.7 | 内燃机火花塞, 轴承, 化工、石油用泵的密封环, 火箭、导弹导流罩, 坩埚, 热电偶套管, 刀具等 |
| | 氮化硅瓷 反应烧结 热压烧结 | 2.4~2.6 | 166~206 | 141 | 1200 | 2.99 | 耐磨、耐腐蚀、耐高温零件, 如石油、化工泵的密封环, 电磁泵管道、阀门热电偶套管, 转子发动机刮片, 高温轴承, 刀具等 |
| | | 3.10~3.18 | 490~590 | 150~275 | — | 3.28 | |
| | 氮化硼瓷 | 2.15~2.2 | 53~109 | 25 (1000°C) | 233~315 | 1.5~3 | 坩埚, 绝缘零件, 高温轴承, 玻璃制品成型模等 |
| | 氧化镁瓷 | 3.0~3.6 | 160~280 | 60~80 | 780 | 13.5 | 熔炬 Fe, Cu, Mo, Mg 等金属的坩埚及熔化高纯度 U, Th 及其合金的坩埚 |
| | 氧化铍瓷 | 2.9 | 150~200 | 97~130 | 800~1620 | 9.5 | 高温绝缘电子元件, 核反应堆中子减速剂和反射材料, 高频电炉坩埚等 |
| 氧化锆瓷 | 5.5~6.0 | 1000~1500 | 140~500 | 1440~2100 | 4.5~11 | 熔炼 Pt, Pd, Rh 等金属的坩埚、电极等 | |

8.2.1 General ceramics



THE END

8.2.2 Special ceramics



THE END



氮化硅陶瓷

反应烧结氮化硅陶瓷零件

Reaction Sintered Si_3N_4 Ceramic Parts







§ 8-3 The cermet

8.3.1 Method and application of powder metallurgy



THE END

8.3.2 The cermet hard alloy

1. Property feature of hard alloy
2. Classification, name and application of hard alloy

表 8-2 常用硬质合金的代号、成分和性能（摘自 YB 849—75）

| 类别 | 代号① | 化学成分 | | | | 物理、力学性能 | | |
|--------|-------|------|-----|------|----|-----------------------------|-----------------|-------------------|
| | | WC | TiC | TaC | Co | 密度 /g · cm ⁻³ | 硬度 HRA (不低于) | 抗弯强度 /MPa(不低于) |
| 钨钴类合金 | YG3X | 96.5 | — | <0.5 | 3 | 15.0~15.3 | 91.5 | 1100 |
| | YG6 | 94 | — | — | 6 | 14.6~15.0 | 89.5 | 1450 |
| | YG6X | 93.5 | — | <0.5 | 6 | 14.6~15.0 | 91 | 1400 |
| | YG8 | 92 | — | — | 8 | 14.5~14.9 | 89 | 1500 |
| | YG8C | 92 | — | — | 8 | 14.5~14.9 | 88 | 1750 |
| | YG11C | 89 | — | — | 11 | 14.0~14.4 | 86.5 | 2100 |
| | YG15 | 85 | — | — | 15 | 13.9~14.2 | 87 | 2100 |
| | YG20C | 80 | — | — | 20 | 13.4~13.8 | 82~84 | 2200 |
| | YG6A | 91 | — | 3 | 6 | 14.6~15.0 | 91.5 | 1400 |
| | YG8A | 91 | — | <1.0 | 8 | 14.5~14.9 | 89.5 | 1500 |
| 钨钴钛类合金 | YT5 | 85 | 5 | — | 10 | 12.5~13.2 | 89 | 1400 |
| | YT15 | 79 | 15 | — | 6 | 11.0~11.7 | 91 | 1150 |
| | YT30 | 66 | 30 | — | 4 | 9.3~9.7 | 92.5 | 900 |
| 通用合金 | YW1 | 84 | 6 | 4 | 6 | 12.8~13.3 | 91.5 | 1200 |
| | YW2 | 82 | 6 | 4 | 8 | 12.6~13.0 | 90.5 | 1300 |

①代号中的“X”字，代表该合金是细颗粒合金；“C”字是粗颗粒合金；不加字的为一般颗粒合金。“A”字代表含有少量 TaC 的合金。

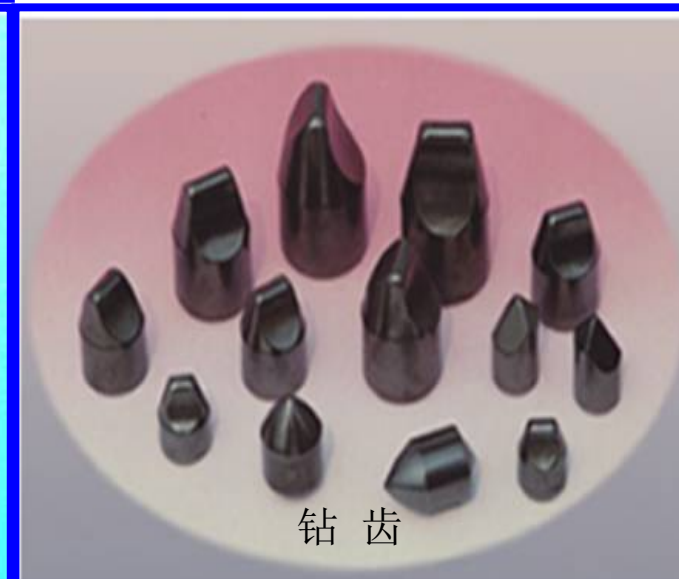
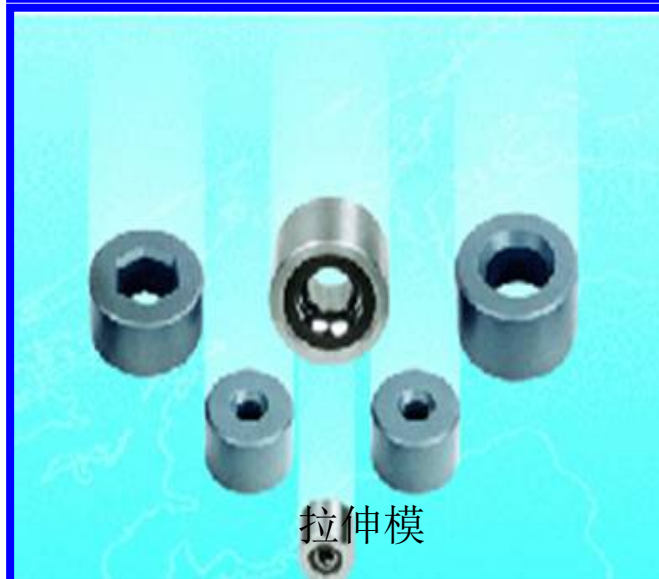
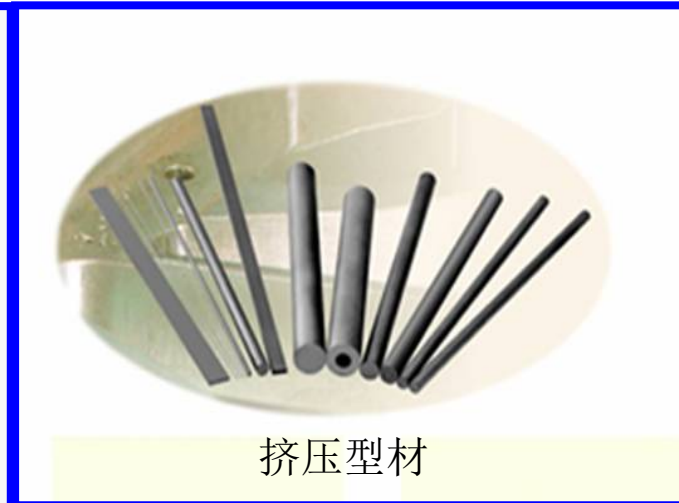
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moulds for stamping and drawing

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3. The steel-cohered hard alloy



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